SMALL BUSINESS FINANCING AND THE POST-2008 CREDIT PARADIGM: THE U.S. SMALL BUSINESS ADMINISTRATION AND KEY FACTORS TO SUPPORT TRADITIONAL CREDIT MARKETS

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I. INTRODUCTION

Small businesses—having created 64% of net new American jobs in the past fifteen years[1]—are the engine of the American economy. During the recent recession, however, small businesses have suffered disproportionate job loss as the result of frozen credit markets among other factors.

This paper explores the role of small businesses in the U.S. economy and the key effects of the post-2008 credit paradigm on U.S. small businesses (see Section II). In exploring the lead up to the 2008 credit frictions and its economic ripple effects, this study investigates the key levers that stalled the traditional small business credit market through a supply and demand analysis. This stall ultimately led to a peak to trough loss of 3.7 million jobs[2] and a 14.4% ($102.2 billion) drop in small businesses lending.[3]

Furthermore, using this same framework this study explores government response to the frozen small business credit markets, specifically through the lens of the U.S. Small Business Administration (SBA) and two pieces of legislation—the *American Recovery and Reinvestment Act of 2009*[4] ("Recovery Act") and the *Small Business Jobs*

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[1] U.S. DEP'T LAB., BUREAU OF LAB. STAT., BUSINESS EMPLOYMENT DYNAMICS (1993–2009).

[2] U.S. DEP'T LAB., BUREAU OF LAB. STAT., BUSINESS EMPLOYMENT DYNAMICS (Q1 2007–Q1 2009), *available at* http://www.bls.gov/schedule/archives/cewbd_nr.htm.

[3] FDIC CALL REPORT DATA (June 2008–March 2011). Small Business Loans represent balance sheet loans outstanding less than $1 million. March 2011 represents current trough, however the total loans outstanding continue to decline.

[4] American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115 (2009).

Act of 2010[5] (Jobs Act) (see Section III). Through these targeted government responses, SBA loan guarantees supported $42 billion in lending.

Finally, to understand best practices from the recession for a government response to a credit crisis, this paper examines the relative importance of key credit market factors on small business lending (see Section IV). Using time-series data, this paper seeks the best-fit model for small business lending by examining lender volume capacity (e.g., capitalization), lender distribution capacity (e.g., points of access) and borrower capacity (e.g., collateral). This study ultimately uncovers capitalization to be a vital gating issue, and both distribution capacity and borrower capacity (assuming constant demand) to have greater direct impact on lending. Thus, recognizing the levers available to government, increased points of access to support small business lending in government programs, in tandem with other efforts, are of paramount concern.

II. SMALL BUSINESS & THE U.S. ECONOMY

Small businesses[6] are the engine of the U.S. economy and touch a majority of Americans on a daily basis. According to the U.S. Census Bureau there are 27 million small businesses (firms), which represents 99.93% of all firms and 99.79% of all employer firms.[7] Furthermore, small businesses employ half of the American workforce (59.6 million Americans, with a payroll of $2.2 trillion).[8] Even more essential to the economy, small businesses are the driver of employment growth—having created 65% of all net new jobs (9.8 million jobs) from 1993 to 2009.[9]

Much of this is driven by the firm dynamics cycle of firm startups, expansions, contractions and deaths. As such, new firm creation is essential

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[5] Small Business Jobs Act of 2010, Pub. L. No. 111-240, 124 Stat. 2504.

[6] Note: The definition of Small Business can vary by source or federal agency. For the purposes of this paper, Small Businesses will be defined as all firms with 500 employees or less. The U.S. Small Business Administration defines a small business: Congress defined small businesses as those that are: (1) independently owned and operated; (2) not dominant in their field of operation; and (3) under a certain size. *Am I a Small Business Concern?*, U.S. SMALL BUSINESS ADMIN., http://www.sba.gov/content/am-i-small-business-concern (last visited Oct. 23, 2011). These size standards vary by industry code for firm revenues, owner net worth and number of employees. *Id.*

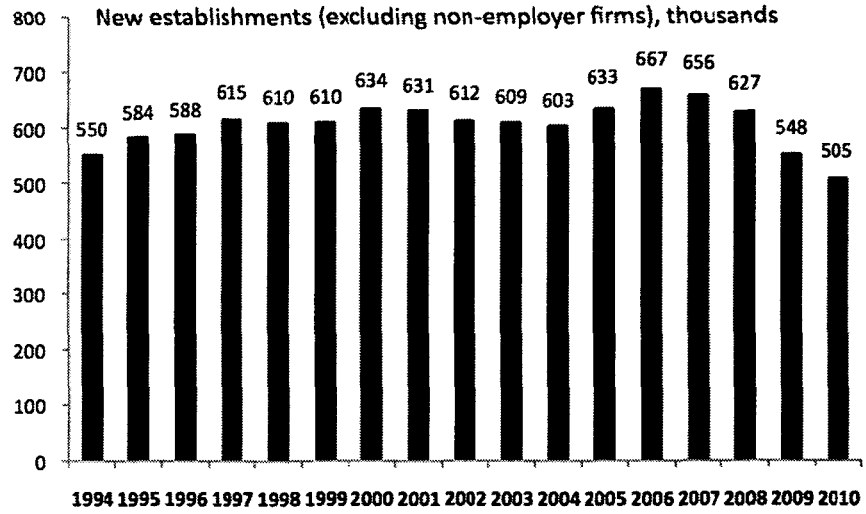
[7] U.S. CENSUS BUREAU, TABLE 2A: EMPLOYMENT SIZE OF EMPLOYER AND NONEMPLOYER FIRMS (2008), http://www.census.gov/econ/smallbus.html.

[8] *Id.*

[9] U.S. DEP'T LAB., *supra* note 1.

to the economy and many of these start-up businesses are the high-growth "gazelles."[10]

Figure 1. New Business Starts
Number of Establishments less than 1 year old, March 1994 - March 2010



Source: BUREAU OF LAB. STAT., BUS.INESS EMP. DYNAMICS, *Entrepreneurship and the U.S. Economy, http://www.bls.gov/bdm/entrepreneurship/bdm_chart1.htm* (last visited Sept. 25, 2011).

A. *The Credit Crunch of 2008*

> The basic cycle of financial crises is that credit is cheap and easy to get for a time. Banks relax their standards too much, leading to excess lending and leverage. When the credit crisis hits, they slam on the brakes and shift into reverse. Banks pull back, not just from those companies that are more at risk of failure, but from all companies.[11]
>
> *- Timothy Geithner, U.S. Secretary of Treasury*

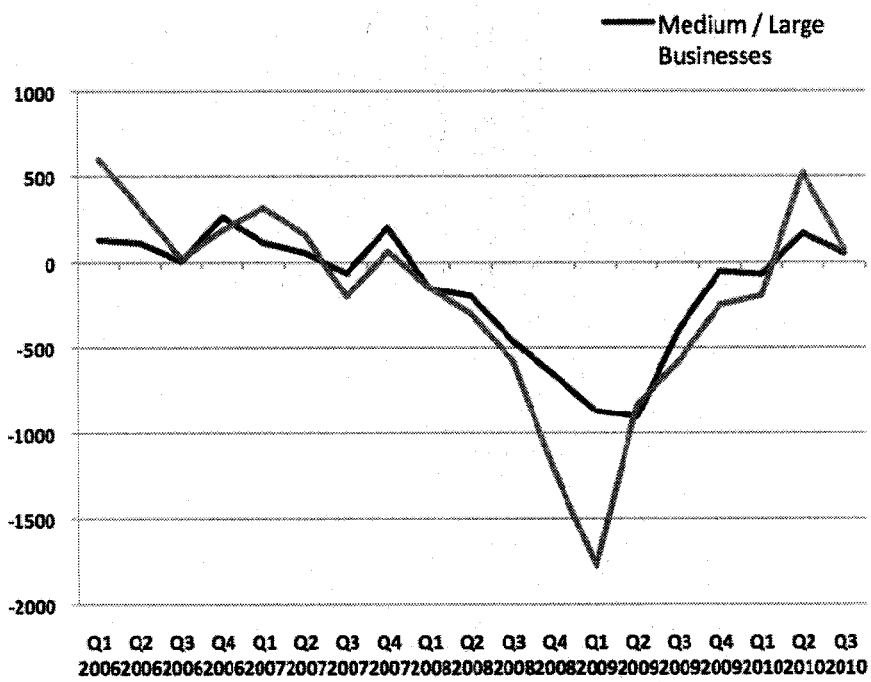
As the largest creator of jobs in the economy, small businesses are also acutely affected by changes to the economic environment, as evidenced by the credit crunch of 2008. From the first quarter of 2007 through the first quarter of 2009, small businesses shed 3.7 million jobs. This represents

[10] "Gazelles" can be defined as high-impact firms that exhibit both relatively high employment and revenue growth for their particular industry. ZOLTAN ACS, WILLIAM PARSONS & SPENCER TRACY, SBA OFFICE OF ADVOCACY, HIGH-IMPACT FIRMS: GAZELLES REVISITED 1 (June 2008).

[11] Timothy Geithner, U.S. Sec. Treasury, Opening Remarks at Small Business Conference (Nov. 18, 2009), *available at* http://www.treasury.gov/press-center/press-releases/Pages/tg412.aspx.

64% of all jobs lost over that period, with medium and larger firms shedding two million jobs. Even before the consequences on the broader economy became evident, small business were among the first to see the effects of this economic crisis. In the third and fourth quarters of 2007, small businesses saw a net loss of 141,000 jobs while larger businesses gained a net 136,000 jobs.[12]

Figure 2. U.S. Employment by firm size
Quarterly net change in employment by firm size class, Q1 2006 - Q3 2010
Seasonally adjusted, thousands



Source: BUREAU OF LAB. STAT., BUS. EMP. DYNAMICS, *Quarterly Net Change by Firm Size Class, Seasonally Adjusted,* http://www.bls.gov/web/cewbd/table_e.txt (last visited Sept. 25, 2011).

Much of this can be contributed to a slowing of the number of new business starts. These new businesses represent both high-growth "gazelles" which will grow to be the largest job creators, as well as Main Street (i.e., non-traded) small businesses, which are an important part of

[12] DEP'T. LAB., BUREAU OF LAB. STAT. BUSINESS EMPLOYMENT DYNAMICS: FOURTH QUARTER 2007, *available at* http://www.bls.gov/schedule/archives/cewbd_nr.htm.

churn dynamics. Without such replacement dynamics, the overall stock of these important Main Street firms would decline. In fact, the number of new private sector establishments in 2010 of 505,000 was 18.8% lower than the previous ten year average of about 620,000 (See Figure 1, supra).[13]

B. *Causes of the credit crunch*

This persistent decline in small business employment begs the question of causes, many of which can be attributed to a severely constrained credit market in which about 60% of small businesses reported they could not access the credit they needed.[14]

It is generally agreed that the immediate cause of the credit crunch stemmed from a sharp increase in U.S. subprime mortgage defaults,[15] first spiking in February 2007.[16] From 1996 to 2006, subprime mortgages increased from 9.5% to 23.5% of all mortgage originations, valued at $600 billion.[17] Much of this was fueled by lower interest rates—the bank Prime loan rate dropped from an average of 9.23% in 2000 to 4.12% in 2003.[18] This was followed by a period of easing lender credit standards from October 2003 until October 2006.[19]

As noted in the *Financial Crisis Inquiry Commission Report*, homeownership reached an all-time high of 69.2% in 2004,[20] while housing values increased rapidly by more than 105% between January 2000 and

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[13] James Manyika et al., *An Economy That Works: Job Creation and America's Future*, MCKINSEY GLOBAL INSTITUTE, 16–17 (June 2011), *available at* http://www.mckinsey.com/mgi/publications/us_jobs/index.asp.

[14] William C. Dunkelberg & Holly Wade, *NFIB Small Business Economic Trends*, NFIB RES. FOUND., 15 (Oct. 2009), *available at* www.nfib.com/portals/0/pdf/sbet/sbet201012.pdf.

[15] Four general mortgage categories exist in the United States, broadly defined as prime, jumbo, Alt-A, and subprime. Generally speaking, a subprime loan typically serves borrowers unable to access the other, more conventional mortgage types. Consequently, subprime borrowers pay a higher cost of capital. In many instances the rate of repayment is adjustable.

[16] Paul Mizen, *The Credit Crunch of 2007-2008: A Discussion of the Background, Market Reactions, and Policy Responses,* FED. RES. BANK OF ST. LOUIS REV., 531, 533 (Sept./Oct. 2008), *available at* research.stlouisfed.org/publications/review/08/09/Mizen.pdf.

[17] Financial Crisis Inquiry Commission, *Final Report of the National Commission on the Causes of the Financial and Economic Crisis in the United States*, THE FIN. CRISIS INQUIRY REP. 70 (Jan. 2011), *available at* www.fdlp.gov/component/content/article/42.../884-fcic-report.

[18] *Monthly Bank Prime Loan Rate,* FED. RES. BANK OF ST. LOUIS, http://research.stlouisfed.org/fred2.

[19] *Net Percent of Domestic Respondents Tightening Standards for Commercial and Industrial Loans Small Firms*, FED. RES. BANK OF ST. LOUIS, http://research.stlouisfed.org/fred2/series/DRTSCIS?cid=32239.

[20] THE FINANCIAL CRISIS INQUIRY REPORT, *supra* note 17, at 34.

April 2006.[21] However, an increase in subprime defaults, specifically among adjustable rate mortgages, and a decrease in housing values created a vicious cycle that fueled both trends. By 2007 one in five subprime adjustable rate mortgages were in serious delinquency (ninety or more days overdue).[22] This figure would rise to 40% in 2009.[23]

During this period of subprime growth, there was also an increase in the securitization of loans, specifically collateralized debt obligations (CDOs), which serve as a means of pooling risk. In fact, in 2007, subprime securities issued exceeded the value of the underlying mortgages for the year.[24] These mortgages were essentially pooled with other loan types, packaged into tranches, and sold based on the risk of the underlying assets (and the commensurate interest rate paid). Additionally, a market for insurance products against CDOs, known as credit default swaps (CDSs) grew—estimated between $45 and $62 trillion in 2007.[25] However, as noted by a 2008 St. Louis Federal Reserve paper:

> Policymakers, regulators, markets, and the public began to realize that subprime mortgages were very high-risk instruments when default rates mounted in 2006. It soon became apparent that the risks were not necessarily reduced by pooling the products into securitized assets because the defaults were positively correlated. This position worsened because subprime mortgage investors concentrated the risks by leveraging their positions with borrowed funds, which themselves were funded with short-term loans. Leverage of 20:1 transforms a 5 percent realized loss into a 100 percent loss of initial capital.[26]

Overall, the exposure to these products extended deep into the financial system, leading to fundamental changes in the entire market as defaults grew. This ultimately led to hundreds of billions in write downs (or the reclassification of asset values) from large financial institutions.[27] And as lenders and exposed financial firms lacked adequate capital, market factors caused an acute drop in U.S. equities. This led to the bankruptcy or sale of several large private financial institutions including Bear Stearns, Merrill Lynch, Countrywide Financial, and Lehman Brothers, as well as

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[21] "The S&P Case-Shiller Home Price Index" is an index of housing values for a composite of ten or twenty Metropolitan Statistical Areas; the above data utilized the Composite 20 Index and is seasonally adjusted (January 2000 = 100.59).
[22] THE FINANCIAL CRISIS INQUIRY REPORT, *supra* note 17, at 216–217.
[23] *Id.*
[24] *Id.* at 70.
[25] Markus K. Brunnermeier, *Deciphering the Liquidity and Credit Crunch 2007–2008*, 23 J. OF ECON. PERSP. 77, 79 (2009).
[26] Mizen, *supra* note 16, at 531, 539.
[27] Brunnermeier, *supra* note 25 at 77, 86.

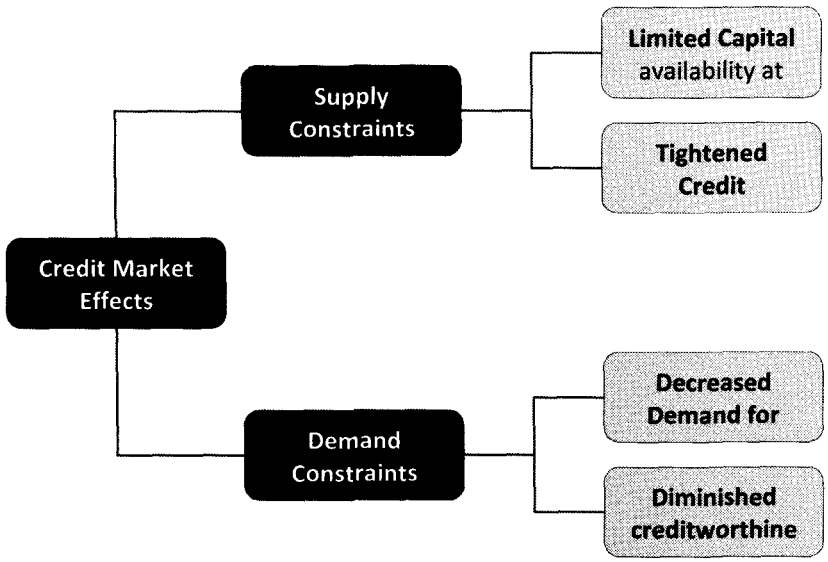
government intervention to support, among others, insurer American International Group.

The overall causes and symptoms of the 2008 credit crunch cannot aptly be summarized in this sub-section. Myriad other factors including accounting mechanisms (e.g., repos), regulation, effects on the Commercial Paper Market and countless others played a pivotal role in creating a new credit paradigm in 2008. Nonetheless, for the purposes of this study, which focuses on the consequences for small business and necessary remedies, the key takeaway is that small businesses faced a new world in 2008 with increasing cost of capital as well as tightening credit standards, coupled with decreased housing values and uncertain sales.

C. *The New Credit Paradigm*

This new economic reality affected the small businesses credit market in four distinct ways:

Figure 3. Credit Market Effects

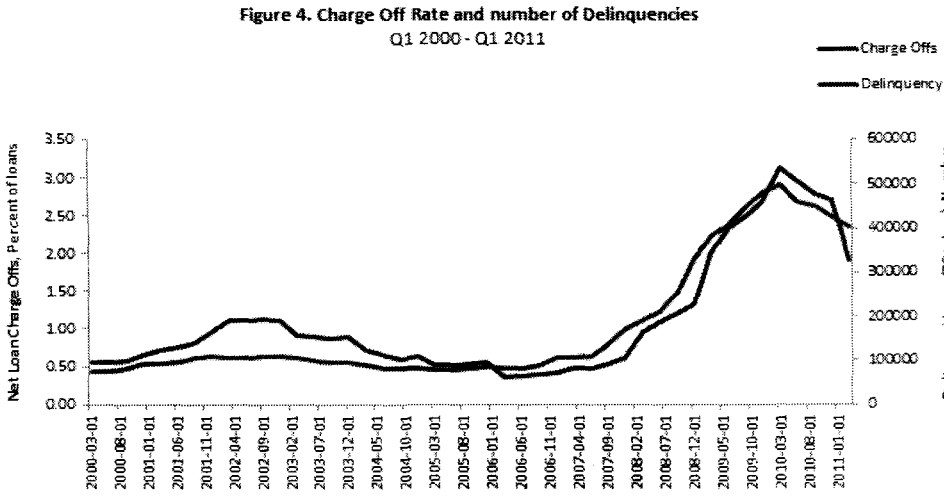


1. *Supply Constraints*

A. Limited capital availability at financial institutions.

As a result of these market changes, banks were left with less capital to support lending, affecting their volume capacity. In 2008, for example,

bank write-offs totaled more than $1.8 trillion.[28] At the same time, banks were faced with additional calls on their existing capital, led by a surge in delinquencies and eventual charge-offs. From March 2006 to March 2010, the overall charge-off rate on loans outstanding increased from 0.35% to a peak of 3.12% and the number of delinquencies increased by over 500%. At the same time regulators required lenders to hold higher amounts of capital against mounting defaults.



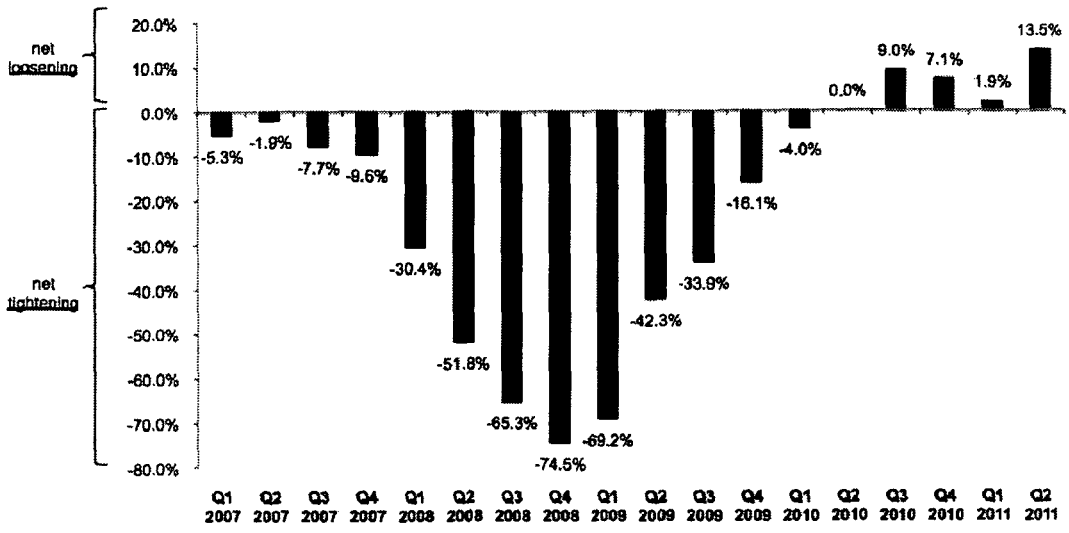
Source: Charge off and Delinquency Rates on Loans and Leases at Commercial Banks, FED. RES. BOARD, *http://www.federalreserve.gov/releases/chargeoff/* (last visited Sept. 25, 2011).

B. Tightened Credit Standards

During this period, and interlinked with volume capacity, small businesses also saw bank credit standards tighten significantly. According to the Federal Reserve Senior Loan Officer Survey, small business credit standards tightened for thirteen straight quarters starting in the first quarter of 2007. During this same period credit standards for larger businesses only tightened for ten quarters, with standards easing much sooner as well.

[28] *The Small Business Economy 2010: A Report to the President*, U.S. SMALL BUS. ADMIN., 3 (2010), *available at* www.sba.gov/sites/default/files/sb_econ2010.pdf.

Figure 5. Small Business Credit Standards
Net loosening of small business credit standards, Q1 2007 - Q2 2011



Source: Survey of Senior Loan Officers, Figure 1: *Measures of Supply and Demand for C&I Loans*, FED RES. BOARD (July 2011), http://www.federalreserve.gov/boarddocs/snloansurvey/201108/chartdata.htm

1. *Demand Constraints*

On the demand side, small businesses lending was affected by two key factors. Firstly, there was an actual decrease in demand for capital itself as sales plummeted and uncertainty rose. On the other hand, for those who actually sought credit, many suffered from decreased creditworthiness due to a decrease in available collateral.

A. Decreased Demand for financing from small businesses

According to the U.S. Census Department monthly estimates of retail and food services sales, total retail and food sales grew on average by 5.5% from 1992 to 2008, including annualized growth of 5.9% during the recessionary period of 2001.[29] However, sales decreased by 9.2% from 2008 to 2009 to $312 billion.[30] Consequently, a cohort of small businesses

[29] *Estimates of Monthly Retail and Food Services Sales by Kind of Business: 1992-2011*, U.S. CENSUS BUREAU (September 14, 2011), http://www.census.gov/retail/. Estimates are shown in millions of dollars and are based on data from the Monthly Retail Trade Survey, Annual Retail Trade Survey, and administrative records.
[30] *Id.*

decreased their capital needs and did not apply for credit. The National Federation of Independent Businesses (NFIB), which surveys its small businesses members, found that in 2009 only 55% of small businesses attempted to borrow funds.[31] This figure further declined to 48% in 2010.[32] Additionally, the Federal Reserve Board Survey of Senior Loan Officers[33] indicates seventeen straight quarters of net weakened demand from small businesses for commercial and industrial loans.[34]

This shift is also apparent in decreased consumer sentiment, which can often be used as a gauge of small business plans for expansion (or lack thereof). From January 2007 to March 2009 the NFIB Index of Small Business Optimism lost 18.1% of its value, and reached a low score of 81.0.[35] Even more drastic, the Discover Small Business Watch Survey of Economic Confidence lost 40.1% of its value from January 2007 to November 2008, reaching a low score of 67.5.[36] An additional subset of small businesses did not seek credit out of fear and/or the assumption that they would not be provided credit. According to the NFIB, 11% of those who did not attempt to borrow were these "discouraged borrowers."[37] It should be noted, however, that the scale of this decline in small business credit demand is debated.

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[31] William J. Dennis, Jr., *Small Business Credit in a Deep Recession*, NFIB RESEARCH FOUND. (Feb. 2010).

[32] Press Release, National Federation of Independent Business, Small Businesses' Demand for Credit Fell for a Second Consecutive Year (Feb. 2, 2011), http://www.nfib.com/press-media/press-media-item?cmsid=55892.

[33] It should be noted that the Senior Loan Officer Survey only captures demand for "funds actually disbursed as opposed to requests for new or increased line of credit." *The July 2010 Senior Loan Officer Opinion Survey on Bank Lending Practices*, BOARD OF GOVERNORS OF THE FED. RESERVE SYS., DIVISION OF MONETARY AFFAIRS 59 (2010), *available at* http://federalreserve.gov/boarddocs/snloansurvey/201008/fullreport.pdf. Going forward, demand-side data that captures borrower applications will be collected by the new Consumer Finance Protection Bureau under required data collection provisions in the Dodd Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203, § 1071, 124 Stat. 2056 (2010).

[34] *Net Percentage of Domestic Respondents Reporting Stronger Demand for Commercial and Industrial Loans Small Firms (DRSDCIS)*, BOARD OF GOVERNORS OF THE FED. RESERVE SYS. (2011), *available at* http://research.stlouisfed.org/fred2/series/DRSDCIS?cid=32239.

[35] William C. Dunkleberg & Holly Wade, NFIB SMALL BUS. ECONOMIC TRENDS 4 (2011), *available at* http://www.nfib.com/Portals/0/PDF/sbet/sbet201108.pdf.

[36] Press Release, Discover Financial Services, Discover Small Business Watch: Small Business Economic Confidence Continues to Fall (Jan. 29, 2007), *available at* http://www.rasmussenreports.com/public_content/business/indexes/discover_small_business_watch/small_business_economic_confidence_rebounds_in_january; Press Release, Discover Financial Services, Discover Small Business Watch: Small Business Economic Confidence Continues to Fall (Nov. 24, 2008), *available at* http://www.rasmussenreports.com/public_content/business/indexes/discover_small_business_watch/discover_r_small_business_watch_sm_small_business_economic_confidence_continues_to_fall.

[37] Dennis, *supra* note 31, at 10.

2. *Diminished Creditworthiness*

Additionally, many small businesses found themselves lacking not only an appropriate credit score (as defined by the new credit standard paradigm), but also without necessary collateral given the downturn in the housing market. According to the S&P/Case-Shiller Home Price Index,[38] housing values rose 105.3% from January 2000 to April 2006; however, values declined rapidly by 31.8% from April 2006 to May 2009. Furthermore, according to the National Federation of Independent Businesses (NFIB) and Gallup, approximately 16% of small businesses indicated borrowing against their homes for business purposes and 7% reported using their homes as direct collateral.[39] Leveraging this same data and a Barlow Survey, researchers from the Cleveland Federal Reserve found that of the $31.5 billion decline in home equity loans since 2007—$7.9 billion of that translates into lost small business credit.[40]

3. *Effects on Small Business Financing*

In total, the frictions created by diminished capital availability, tightening credit standards, decreased demand for capital and a decline in available collateral, led to a stalling of the credit markets. Specifically, the market for small business financing dried up. The best proxy for aggregate small business credit data is FDIC Call Report data. "Small business loans" are defined as outstanding loans (e.g., on balance sheet) of less than $1 million. This definition includes:

a) Loans secured by non-farm, non-residential properties of less than $1 million held in domestic offices, as well as

b) Commercial and industrial loans (C&I) of less than $1 million held in domestic offices on outstanding loans under $1 million.

From June 2006 to June 2008, lending to small businesses increased by 12.2%, or $77.3 billion, to $711.5 billion in loans outstanding. However, starting June 2008, loans under $1 million outstanding began a precipitous decline, falling by 14.4% or $102.2 billion to $609.3 billion in March 2011.[41]

Furthermore, the Congressional Oversight Panel, formerly chaired by Elizabeth Warren, reported in 2010 that between 2008 and 2009 small

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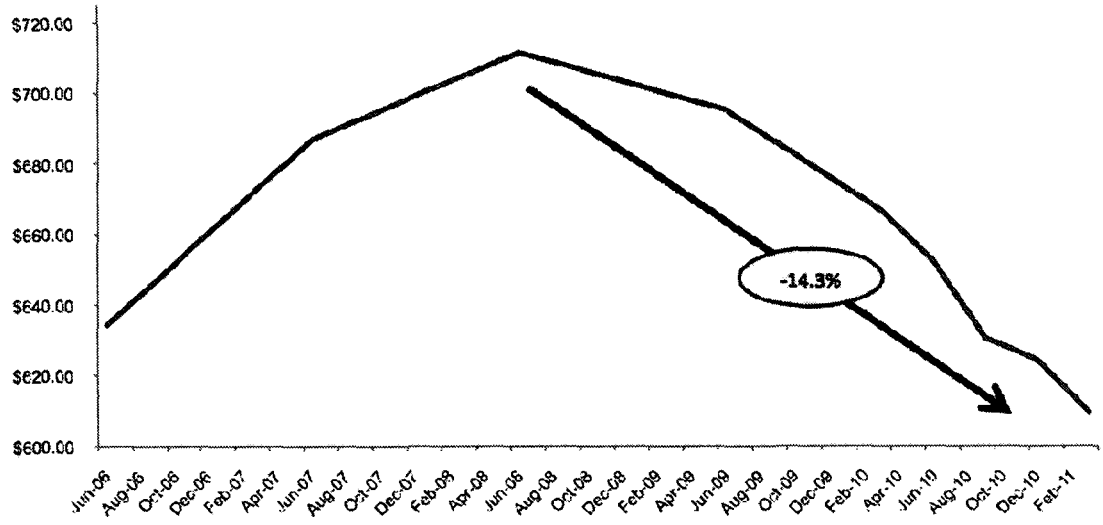
[38] *See supra* note 21.
[39] Mark E. Schweitzer & Scott A. Shane, *The Effect of Falling Home Prices on Small Business Borrowing*, FED. RESERVE BANK OF CLEVELAND (Dec. 20, 2010), http://www.clevelandfed.org/research/commentary/2010/2010-18.cfm.
[40] *Id.*
[41] FDIC CALL REPORT DATA, *supra* note 3.

business loan portfolios from banks receiving TARP funds fell by 9%, which is more than double the 4.1% drop in their overall portfolios.[42]

Figure 6. Small Business Lending
Outstanding loans less than $1 million, June 2006 - March 2011
USD billions



Source: FDIC CALL REPORT DATA, *supra* note 3.

Note: Data is annual through March 2010; quarterly thereafter.

This decline in small business lending was even sharper among small dollar loans below $100,000, which historically comprise 88% of small business lending by number of loans (1995–2010). The majority of the $102.2 billion (or 14.4% percent) decline in small business loans from June 2008 to March 2011 came from these small dollar loans.

a) **By Volume.** During this period, outstanding loans less than $100,000 decreased by 18.1% or $30.8 billion and outstanding loans between $100,000 and $250,000 decreased by 16.8% or $21.1 billion. Conversely, outstanding loans between $250,000 and $1 million, though decreasing by $50.3 billion, decreased by a smaller 12.1%.

b) **By Number.** During this period total small business loans decreased in number by 5.98 million loans or 22%. Ninety-five

[42] CONG. OVERSIGHT PANEL, MAY OVERSIGHT REPORT: THE SMALL BUSINESS CREDIT CRUNCH AND THE IMPACT OF THE TARP, 51 (2010), *available at www.gpo.gov/fdsys/pkg/CPRT.../pdf/CPRT-111JPRT56095.pdf.*

percent of this loss (5.69 million loans) was from loans below $100,000, which translates to 22.8% decline.

This data is particularly of note since small dollar loans are often correlated with loans to historically underserved communities. According to a January 2010 study by the Minority Business Development Agency (MBDA), minority firms typically receive lower dollar loan amounts than non-minority firms. Between 1997 and 2002, the average loan amount for a high sales minority firm was $149,000 versus $310,000 for high-sales, non-minority firms, which is more than double.[43]

This situation not only impacted the overall credit market, but the SBA loan guarantee program, as well. From October 2008 to January 2009, SBA 7(a) and 504 loans declined by 45% from a fiscal 2008 monthly gross average of $1.5 billion to $830 million in 2009(see section 3.1 for further discussion).[44]

D. *Alternate Sources of Financing*

Small businesses are also more reliant on traditional credit than other sources. According to the Federal Reserve, over 80% of small businesses use credit cards as a means of capital—64% using small business cards.[45] And a 2009 study by the National Small Business Association (NSBA) showed that 34% of small businesses reported financing over a quarter of their operations through credit cards.[46] Nonetheless, during the decline in small business access to traditional credit, additional sources of non-traditional and higher-cost credit, such as credit cards or home equity lines, also evaporated. Additionally, many small businesses reported sudden changes to their terms—63% reported increased interest rates, 41% reported reduced credit limits, and 25% reported being switched from fixed to variable interest rates without consent.[47]

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[43] Robert W. Fairlie & Alicia M. Robb, *Disparities in Capital Access Between Minority and Non-Minority-Owned Businesses: The Troubling Reality of Capital Limitations Faced by MBEs,* U.S. DEP'T OF COM., MINORITY BUS. DEV. AGENCY 35 (2010).

[44] *May Oversight Report: The Small Business Credit Crunch and the Impact of the TARP, supra* note 42, at 34.

[45] *Report to the Congress on the Use of Credit Cards by Small Businesses and the Credit Card Market for Small Businesses,* BOARD OF GOVERNORS OF THE FED. RESERVE SYS., 28 (2010).

[46] *2009 Small Business Credit Card Survey,* NAT'L SMALL BUS. ASS'N (NSBA), 4 (2009), *available at* www.nsba.biz/docs/09CCSurvey.pdf.

[47] Many of these practices will be banned under new rules proposed by the Dodd-Frank Act.

III. GOVERNMENT RESPONSE

The effects of the 2008 credit crunch created a vicious cycle and frictions that stalled the U.S. credit markets—thus, prompting an intervention from the new administration of President Barack Obama in January 2009 to resurrect the American credit market.[48] Specifically, actions taken by the SBA between January 2009 and September 2010 were focused on reviving the U.S. credit markets for small businesses in the same four areas identified in Figure 3 as affected by the new post-2008 credit paradigm.

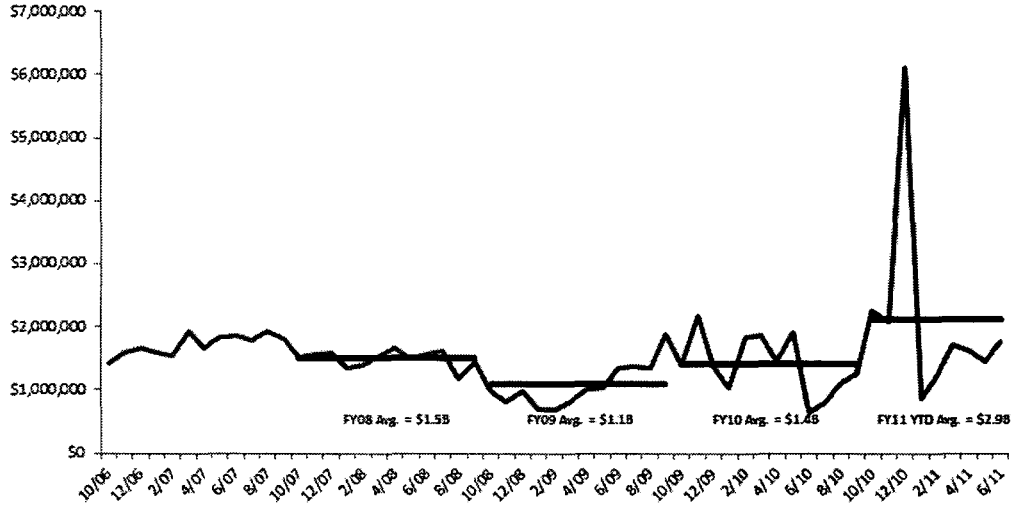
Through the Recovery Act in 2009 and the Jobs Act in 2010, the SBA provided small businesses much needed access to capital. Overall, the SBA guaranteed over $42 billion of capital in Recovery Act and Jobs Act supported loans.

[48] Note: Prior to intervention by the Obama Administration and the new Congress in February 2009, many actions were taken by the Bush Administration and Congress to address the credit crisis including the Troubled Asset Relief Program (TARP) in October 2008. Additionally, the Term Asset-Backed Securities Loan Facility (TALF) program was first announced by the Federal Reserve in November 2008.

Figure 7. SBA Small Business Lending Volume[49]

SBA 7(a)/504 Loan Volume, October 2006 – June 2011

Monthly Loan Volume by Gross Dollar(thousands)



Source: U.S. Small Business Administration

A. *The U.S. Small Business Administration*

The SBA was founded by Congress in July 1953 and was advocated for by President Dwight Eisenhower out of the legacy of President Herbert Hoover's Reconstruction Finance Corporation (RFC), the Smaller War Plants Corporation (SWPC) founded in 1942 to support small business contracts in World War II and the Small Defense Plants Administration (SDPA) from the Korean War, as well as the Commerce Department's Office of Small Business (OSB).[50] The SBA was officially established by Congress on July 30, 1953 through the passage of the Small Business Act of 1953.[51]

The mission of the SBA has always been to serve as the chief advocate for small businesses and to provide them support in four key areas: small business access to capital, access to government procurement contracts,

[49] Note: Evident volatility/spikes in SBA 7(a)/504 volume beginning in late 2009 were largely driven by impending expiration of authority or funds for various provisions of the Recovery Act. The large spike in December 2010 was caused by the impending expiration of authority and funds for the Jobs Act provisions.

[50] *Our History,* U.S. SMALL BUS. ADMIN., http://www.sba.gov/about-sba-services/our-history (last visited Sept. 11, 2011) [hereinafter U.S. Small Bus. Admin.].

[51] Small Business Act of 1953, Pub. L. No. 83-163, 67 Stat. 230 (1953).

providing management and technical assistance, as well as providing loans to disaster victims (personal or business).[52] The type and nature of these services have changed and grown over the years, buttressed by administrative changes, as well as congressional mandates, including the Small Business Investment Act of 1958[53] and the Small Business Jobs Act of 2010. Although all of the offices of the SBA are interconnected and now include an Office of Investment, International Trade, and others, for the purposes of this study, the focus will be exclusively on SBA's traditional credit (lending) programs.

With the exception of loans to support victims of disasters, the SBA does not provide direct loans to support small businesses or act as a bank. Instead, it supports access to capital through loan guarantees to lenders that provide capital to small businesses, as well as by providing capital to intermediaries to provide subsequent funds to small businesses. These intermediary relationships range from providing grants and loans to microloan intermediaries to debenture financing for private equity and venture capital funds through the Small Business Investment Company (SBIC) program.[54]

As such, SBA's loan guaranty programs most directly fill a gap in the abovementioned traditional credit market in supporting commercial and industrial loans. SBA loan guaranty programs can generally be bucketed into two broad categories: the sections of the Small Business Act of 1953 in the case of the 7(a) program and the Small Business Investment Act of 1958 for the Section 504 program. They are granted authority from:

- **7(a) Loan Program:** The 7(a) loan is a multi-purpose loan guarantee program that can provide small businesses with real estate, equipment, working capital or expansion capital. In general, the 7(a) program can guarantee loans up to $5 million with a 75% guarantee to lenders for loans greater than $150,000 (and 85% for loans below).[55]
- **504 Program:** The 504 loan program provides small businesses long term financing for fixed assets such as commercial real estate or equipment. A 504 loan is structured with a private lender, taking a senior lien and 50% of project costs, a non-profit Certified Development Company (CDC)

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[52] *See Our History, supra* note 50.
[53] Pub. L. No. 85-699, 72 Stat. 102 (1958).
[54] *See What SBA Offers to Help Small Businesses Grow*, U.S. SMALL BUS. ADMIN., http://www.sba.gov/content/what-sba-offers-help-small-businesses-grow (last visited Sept. 11, 2011).
[55] *Loan Program Quick Reference Guide*, U.S. SMALL BUS. ADMIN., http://www.sba.gov/sites/default/files/files/LoanChartHQ20110728.pdf (last visited Sept. 13, 2011).

covering 40% of the cost, and the borrower contributing 10% equity. The SBA guarantees 100% of the CDC position.[56]

B. *Credit Response*

> The biggest challenge facing small businesses right now is that too many good, creditworthy borrowers still can't find the capital they need to grow and create jobs . . . . Big business can tap into other sources of capital. But small businesses rely heavily on bank credit to start, sustain, and grow their business. That's why they're still hard-hit by this credit crunch. Today's goal is to make sure small businesses can get adequate financing in order to lead us out of this recession–as they have in the past.[57]
>
> - *Karen G. Mills, Administrator of the U.S. Small Business Administration*

Recognizing the frictions that stalled the U.S. small business credit market, and recognizing SBA loan guaranties as a proxy for the health of the overall market, the SBA, Congress, and the new Obama Administration sought to unlock the market. Specifically, actions taken to support the markets recognized the key aforementioned constraints and developed solutions within that framework.

1. *Limited capital availability at financial institutions*

In addressing the issue of capital availability at financial institutions, the Recovery Act and the Jobs Act increased the government guaranty on loans from the typical 75% to 90%. Additional Administration programs from the Jobs Act to support bank capital constraints included the Treasury Department led Small Business Lending Fund, which will provide up to $30 billion in relatively cheap Tier 1 capital to banks with assets less than $10 billion,[58] and the State Small Business Credit Initiative (SSBCI) which will provide $1.5 billion to state-led programs that support small business lending. The SSBCI is expected to create $15 billion in incremental lending.[59] Additionally, up to $15 billion was committed by the Treasury to

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[56] *Id.*

[57] Karen G. Mills, *Federal Reserve Board Forum: Addressing the Financing Needs of Small Businesses*, U.S. SMALL BUS. ADMIN. (July 12, 2010), http://www.sba.gov/administrator/7389/5779.

[58] *See Small Business Lending Fund*, U.S. DEP'T TREASURY (Aug. 25, 2011, 4:01 PM), http://www.treasury.gov/resource-center/sb-programs/Pages/Small-Business-Lending-Fund.aspx.

[59] *See State Small Business Credit Initiative*, U.S. DEP'T TREASURY (Sept. 12, 2011, 9:42 AM), http://www.treasury.gov/resource-center/sb-programs/Pages/ssbci.aspx.

unlock the secondary markets for small business lending by purchasing those securities, thus freeing more capital to be re-lent.

2. *Decreased demand for financing from small businesses*

In addressing weakened demand by small businesses to access necessary capital, provisions in the legislation also reduced or eliminated fees for the 7(a) and 504 loan programs. Such elimination of fees de facto lowered the borrowing costs for small businesses. Jobs Act legislation also increased the statutory size of SBA loans from $2 to $5 million (and $5.5 million for manufacturers in the 504 loan program). This *right-sizing* of loans may also decrease borrower costs as many businesses can now rely on a single source of financing for their needs.

3. *Tightened credit standards/diminished creditworthiness.*

In many ways tightening credit standards and diminished creditworthiness of borrowers represent the same issue in which the gap between lender standards and borrower capacity must be bridged. In addressing the capacity of a borrower, the Jobs Act introduced a refinancing program for 504 loans and also created new size standards that re-define many as small businesses. Furthermore, the increase in SBA loans guarantees was also meant to facilitate the easing of credit standards.

Overall, the results significantly increased SBA loan volumes, subsequently filling a larger part of the gap created by the decline in the overall small business lending market (see Figures 6 and 7). Since fiscal 2009 when monthly SBA volumes declined to a monthly average of $1.09 billion, including only $684 million in January 2009, the monthly average has increased by 95% to the current year-to-date fiscal 2011 average (in July 2011) of $2.12 billion. Furthermore, the secondary market for 7(a) loans unlocked, increasing by 32% to $434 million from its fiscal 2008 average to fiscal 2011 year-to-date, with over 95% sold at premiums above 106%.

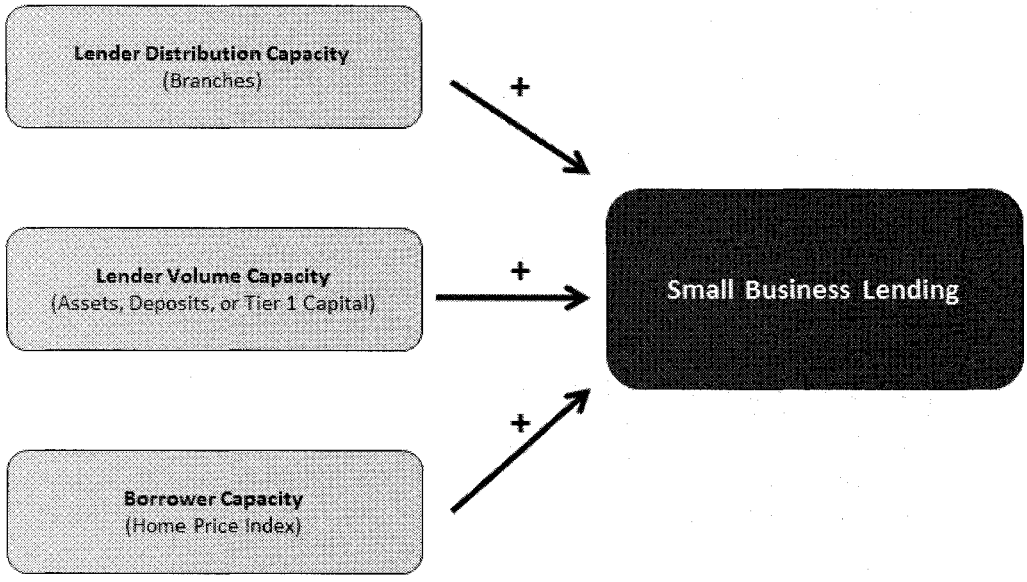
Given the successful results of the SBA, Obama Administration, and congressional response to a decline in government guaranteed credit, a question persists—*What is the relative strength of each lever used to support the small business credit market?* Consequently, this paper uses historical data to explore the relative strength of supply and demand side market factors in predicting small business lending.

IV. SMALL BUSINESS LENDING ANALYSIS

To further understand the causes and implications of stalled credit markets, this paper explores the one-to-one causal relationships between

three independent variables (market factors) and the dependent variable of small business lending, defined as outstanding commercial loans below $1 million. A path diagram and the model for this theory can be found below:

Figure 8. Study Path Diagram



$Yi = \beta 0 + \text{Lender Distribution Capacity} * \beta 1 + \text{Lender Volume Capacity} * \beta 2 + \text{Borrower Capacity} * \beta 3 + \varepsilon$

A. *Data and Methodology*

This analysis utilizes time series data from the Federal Deposit Insurance Corporation (FDIC) as well as from the S&P/Case Shiller Home Price Index. FDIC data is obtained from the Federal Financial Institution Examination Council (FFIEC) Call Report and the Office of Thrift Supervision (OTS) Thrift Financial Reports submitted by FDIC insured depository institution. Currently, all utilized FDIC data is reported quarterly; however, the key dependent variable, small business lending, was only reported annually (each June) until March 2010. The S&P/Case-Shiller Home Price Indices track changes in the value of residential real estate

nationally by metropolitan area and for indices of the ten and twenty largest metropolitan areas.[60]

To ensure a robust data set, this study uses the composite index of ten metropolitan areas since the *Composite 20* index only began reporting in January 2000. Although the individual data points for the *Composite 20* index would provide a more comprehensive view of changes in the housing/collateral market, the narrower scope of the composite ten index should not affect the model. This result is due to the high correlation between the indices (0.9987 for all available monthly data).

Based on the limited availability of small business lending data, annual time series data from 1995 to present (March 2011) is used for each variable. Additionally, each variable uses June data as the annual data point with the exception of domestic branches (distribution capacity). Accessible FDIC data only provides branches for December call reports through 2002 and quarterly thereafter. Therefore, for consistency, this variable uses annual December data for each year.[61] Additionally, since June 2011 data is not yet available, March 2011 data has been used as the 2011 data point for all variables including branches as the best proxy.

From this, the main data issue potentially facing this analysis is the small data sample size of seventeen observations for each variable. This problem should, however, be mitigated as the data covers two economic cycles with recessionary periods in 2001 and 2008–2009 data.

- **Small Business Lending (*SB Loans*):** This paper theorizes that the value of small business loans is causally dependent on lender distribution capacity, lender volume capacity, and borrower capacity. The numeric data for this variable represents the number of domestic loans outstanding less than $1 million.[62]

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[60] *S&P/Case-Shiller Metro Area Home Price Indices*, STANDARD & POOR'S (May 2006), *available at* http://www2.standardandpoors.com/spf/pdf/index/SPCS_MetroArea_HomePrices_Methodology.pdf. "The S&P/Case-Shiller Home Price Indices use the 'repeat sales method' of indexcalculation—an approach that is widely recognized as the premier methodology for indexing housing prices—which uses data on properties that have sold at least twice, in order to capture the true appreciated value of each specific sales unit." *Id.*

[61] The main issue that can be caused by this use of June data is the six month (half a period) lag in branch data. While this may create issues (to be determined later) the results should be muted as the magnitude of branch changes between periods is generally lower, averaging an absolute annual change of 1.39% from 1992 to 2010 as opposed to 6.8% for Assets, as a volume capacity proxy, or 10.4% for housing from 1995 to 2010. *Id.*

[62] FDIC Definition: Amount of currently outstanding loans secured by non-farm, nonresidential properties with original amounts less than $1 million held in domestic offices. Note: (1) Institutions report only those loans having original amounts of less than $1 million (large institutions might have these types of loans

- **Distribution Capacity/Total Branches (*Branches*):** It is theorized that a positive relationship exists between an increase in domestic branches and small business lending, since domestic branches represent physical points of access for the distribution of small business loans. The numeric variable branches represent the total domestic offices for all FDIC insured institutions.[63]

- **Volume Capacity 1/Assets (*Assets*):** It is theorized that a positive relationship exists between an increase in assets and small business lending, since assets represent resources a bank can leverage to lend (including cash). The numeric variable assets represent the total assets held by all FDIC insured institutions at a given period.[64]

- **Volume Capacity 2/Domestic Deposits (*Deposits*):** It is theorized that a positive relationship exists between an increase in domestic deposits and small business lending, since domestic deposits provide a capital base for lending activity. The numeric variable deposits represent the total deposits held in domestic offices of FDIC insured institutions.[65]

- **Volume Capacity 3/Tier 1 Capital (*Tier1*):** It is theorized that a positive relationship exists between an increase in Tier 1 Capital and small business lending, since Tier 1 capital or core capital represents a bank's capital adequacy and health. The numeric variable Tier 1 represents the total Tier 1 capital held by all FDIC insured banks in a given period.[66]

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but not within this size range); (2) For institutions filing only the total number of the aforementioned loans with original amounts of less than $100,000, it was assumed that the total amount of these loans have original amounts of less than $100,000; (3) Available on a quarterly basis as of 2010. Prior to 2010, reported as of June 30th only. *See Instructions for Preparation of Consolidated Reports of Condition and Income (FFIEC 031 and 041),* FEDERAL FINANCIAL INSTITUTIONS EXAMINATION COUNCIL, RC-C-31–RC-C-33 (June 2011), http://www.ffiec.gov/PDF/FFIEC_forms/ffiec031_041_200203_i.pdf.

[63] FDIC Definition: The number of domestic offices (including headquarters) operated by active institutions in the U.S., territories and possessions. *See id.* at A-32.

[64] FDIC Definition: The sum of all assets owned by the institution including cash, loans, securities, bank premises and other assets. This total does not include off-balance-sheet accounts. *See id.* at RC-D-1.

[65] FDIC Definition: The sum of all domestic office deposits, including demand deposits, money market deposits, other savings deposits and time deposits. *See id.* at A-17–A-25.

[66] FDIC Definition: Tier 1 (core) capital includes: common equity plus noncumulative perpetual preferred stock plus minority interests in consolidated subsidiaries less goodwill and other ineligible intangible assets. 12 C.F.R. § 325.2(v) (2011). The amount of eligible intangibles (including mortgage servicing

- **Borrower Capacity/Housing Index (*Housing*):** It is theorized that a positive relationship exists between an increase in the aggregate value of housing prices and small business lending since housing values represent borrower capacity to take on loans as available collateral. The numeric variable "Housing" represents the index value for the average change in home prices for ten major metropolitan statistical areas (MSAs).[67]

Figure 9. Study Data

	Small Business Lending	Distribution Capacity	Volume Capacity			Borrower Capacity
		Total Branches	Assets	Domestic Deposits	Tier 1 Capital	Housing Index
Date	*SB Loans*	*Branches*	*Assets*	*Deposits*	*Tier1*	*Housing*
1995	$349,839,955,000	81,271	$5,189,722,395,000	$3,212,368,189,000	$390,983,662,500	76.66
1996	$368,280,949,000	82,626	$5,422,795,511,000	$3,327,065,368,000	$414,187,675,750	77.47
1997	$388,826,125,000	83,891	$5,803,460,852,000	$3,494,289,801,000	$438,365,439,350	79.91
1998	$410,849,424,000	84,907	$6,229,498,743,000	$3,660,317,196,000	$468,986,287,200	86.63
1999	$440,478,258,000	86,426	$6,594,814,760,000	$3,785,889,167,000	$503,079,973,350	94.65
2000	$481,914,060,000	86,333	$7,163,614,418,000	$4,004,448,986,000	$541,748,714,450	107.34
2001	$509,369,694,000	86,954	$7,635,923,679,000	$4,337,938,627,000	$577,502,971,500	119.50
2002	$534,971,939,000	87,929	$8,039,006,629,000	$4,613,275,852,000	$621,277,860,000	132.22
2003	$549,197,039,000	89,250	$8,923,262,177,000	$5,171,805,488,000	$671,946,768,000	149.13
2004	$577,321,017,000	91,875	$9,648,544,817,000	$5,462,524,945,000	$751,202,872,000	178.83
2005	$601,479,505,000	94,177	$10,474,368,258,000	$5,925,885,076,000	$831,461,334,000	208.21
2006	$634,189,004,000	96,850	$11,526,114,005,000	$6,436,719,019,000	$915,633,505,000	225.70
2007	$686,759,579,000	99,183	$12,261,370,672,000	$6,692,011,085,000	$967,387,819,000	216.88
2008	$711,452,500,000	100,613	$13,300,432,661,000	$7,029,159,146,000	$1,014,365,369,000	180.16
2009	$695,225,317,000	100,056	$13,279,680,853,000	$7,555,212,681,000	$1,081,487,594,000	153.04
2010	$652,247,329,000	99,136	$13,199,820,479,000	$7,667,714,922,000	$1,131,935,965,000	160.71
2011	$609,415,717,000	99,078	$13,414,655,013,000	$7,990,505,750,000	$1,187,350,623,000	154.00

B. *Correlation*

A correlation analysis for the six variables was run. From these correlations, it is manifest that all independent variables are correlated to some extent to the dependent variable, small business lending. The most notable correlations are between *Branches-Assets*, *Deposits-Assets*, *Tier1-Assets*, and *Tier1-Deposits*, which were 0.994, 0.993, 0.992, and 0.999. This high correlation, particularly between the combinations of *Assets,*

rights) included in core capital is limited in accordance with supervisory capital regulations.

[67] *S&P/Case-Shiller Metro Area Home Price Indices*, *supra* note 60.

Deposits, and *Tier1* make intuitive sense, as they are all proxies for a bank's volume capacity.

Therefore, additional tests through combinations of all possible regressions need to be run to identify which independent variable best represents volume capacity for this model. Additionally, it should be noted that the correlation between *Housing* and all variables, though still strong, is relatively weak compared to those between all other independent variables, ranging from 0.765 to 0.829.

Figure 10. Correlation Table

	SB Loans	*Branches*	*Assets*	*Deposits*	*Tier1*	*Housing*
SB Loans	1.000					
Branches	0.966	1.000				
Assets	0.960	0.994	1.000			
Deposits	0.929	0.979	0.993	1.000		
Tier1	0.922	0.978	0.992	0.999	1.000	
Housing	0.876	0.829	0.809	0.773	0.765	1.000

These correlations may also be used as a check for severe multicollinearity in the data, a strong correlation between independent variables.[68] In this instance, there does appear to be severe multicollinearity, which exists in eight of ten independent variable combinations (*Branches-Assets; Branches-Deposits; Branches-Tier1; Assets-Deposits; Assets-Tier1; Deposits-Tier1; Branches-Housing;* and *Housing-Assets*). If this multicollinearity appears to affect the regression results, the effect can be tested and quantified through a variance inflation factor.

C. *Multiple Linear Regression Analysis*

In order to estimate the best model for small business lending and assuming that the model is linear, all combinations of independent variable regressions were run, with no more than one volume capacity variable used at any point. The purpose of the fifteen regression combinations is to:

[68] The existence of such multicollinearity, generally noted as a correlation greater than 0.8 between independent variables, may increase the variances and standard error estimates, will cause *t*-scores to fall, and will cause the estimates to become sensitive to changes in specification. It will not, however, affect the adjusted R^2, or overall fit of the estate equation.

a) Identify the best volume capacity variable for a small business lending regression between Assets, Domestic Deposits, and Tier 1 Capital.

b) Test the relationship between the three identified independent variables—Distribution Capacity, Volume Capacity, and Borrower Capacity—against the dependent variable small business lending to identify the relative strength of each as a lever to spur small business lending.

Figure 11. Regression Results (Abbreviated)

		Test														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Independent Variables		Branches Housing Assets	Branches Housing Deposits	Branches Housing Tier1	Branches Assets	Branches Deposits	Branches Tier1	Branches Housing	Housing Assets	Housing Deposits	Housing Tier1	Branches	Housing	Assets	Deposits	Tier1
R2	R2	0.9525	0.9527	0.9551	0.9333	0.9400	0.9457	0.9512	0.9505	0.9241	0.9205	0.9333	0.7665	0.9224	0.8622	0.8506
	Adj. R2	0.9415	0.9418	0.9447	0.9238	0.9314	0.9379	0.9442	0.9435	0.9133	0.9092	0.9288	0.7509	0.9173	0.8530	0.8407
F Test	F	86.90	87.31	92.16	97.97	109.60	121.82	136.31	134.56	85.28	81.07	209.85	49.24	178.40	93.84	85.43
	Sig. F	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Intercept	Coeff.	-3.39E+11	-1.03E+12	-1.22E+12	-9.46E+11	1.46E+12	-1.66E+12	-7.62E+11	1.81E+11	1.71E+11	2.06E+11	-9.97E+11	2.46E+11	1.93E+11	1.88E+11	2.42E+11
	St. Error	7.11E+11	4.28E+11	4.51E+11	7.54E+11	3.89E+11	3.85E+11	1.40E+11	2.3E+10	2.96E+10	2.78E+10	1.06E+11	4.43E+10	2.73E+10	3.80E+10	3.42E+10
	t-stat	-0.476	-2.397	-2.703	-1.253	-3.766	-4.310	-5.433	7.879	5.783	7.404	-9.365	5.567	7.088	4.940	7.090
	P-value	0.642	0.032	0.018	0.231	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Branches	Coeff.	7386520.1	17243720	19796522	16134675	23648596	26074368	13410701				16868433				
	St. Error	10102424	6152763.2	6257089.2	10680055	5552451.8	5270188.8	1843423.3				1164448.1				
	t-stat	0.731	2.803	3.164	1.511	4.259	4.948	7.275				14.486				
	P-value	0.478	0.015	0.007	0.153	0.001	0.000	0.000				0.000				
Assets	Coeff.	0.013			0.002				0.028					0.037		
	St. Error	0.021			0.024				0.004					0.003		
	t-stat	0.607			0.069				7.218					13.357		
	P-value	0.554			0.946				0.000					0.000		
Deposits	Coeff.		-0.015			-0.028				0.045					0.066	
	St. Error		0.022			0.023				0.008					0.007	
	t-stat		-0.654			-1.248				5.394					9.687	
	P-value		0.524			0.233				0.000					0.000	
Tier1	Coeff.			-0.146			-0.237				0.268					0.405
	St. Error			0.137			0.133				0.051					0.044
	t-stat			-1.067			-1.785				5.208					9.243
	P-value			0.305			0.096				0.000					0.000
Housing	Coeff.	605949370	509531390	451473412				568824112	678991626	933693464	976279584		2.08E+09			
	St. Error	264394660	272176573	273204678				251354001	240692148	276097884	278307434		297038409			
	t-stat	2.292	1.872	1.653				2.263	2.821	3.382	3.508		7.017			
	P-value	0.039	0.084	0.122				0.040	0.014	0.004	0.003		0.000			

		Test				
		Mean	Median	Max.	Min.	Range
R2	R2	0.9174	0.9333	0.9551	0.7665	0.1886
	Adj. R2	0.9081	0.9288	0.9447	0.7509	0.1938
F Test	F	109.98	93.84	209.85	49.24	160.61
	Sig. F	0	0	0	0	0

****See appendix for total output from each regression**

Fit of Regression Model

1. R^2 Analysis

In identifying the best fit equation, thirteen of the fifteen regression combinations had a relatively high R2, above 0.900.69 Adjusted R2, unlike regular R2 accounts for the number of independent variables (and increases if an incremental variable improves fit). The same thirteen regression combinations with a high R2 also had a high adjusted R2. Among those, five were extremely high, an R2 greater than 0.950, including Branches-Housing-Assets, Branches-Housing-Deposits, Branches-Housing-Tier 1, Branches-Housing and Housing-Assets. The highest R2, at 0.955, was found in test 3 for Branches-Housing-Tier 1.

From this R2 analysis it is clear that a model using any of the capacity variables (Assets, Deposits, or Tier1) could sufficiently estimate small business lending. If looking exclusively at which capacity variable creates the highest R2, in combination with Branches and Housing, then Tier 1 Capital (Tier1) should be selected. However, R2 only measures the fit of the overall equation and not individual components (or coefficients). Therefore, additional analysis, including an F-Test on the equation, and individual analyses of the variable coefficients must be run.

2. F-Test.

Next, in examining the overall fit of the regression, the F test is observed, which tests the statistical significance of the regression model.[70] In this instance, all fifteen of the regression combinations have a relatively robust *F* statistics and a *F* significance at the 95% level. As such, this test confirms the validity of the models, but provides limited insight into the best fit of the combinations, namely in identifying the best volume capacity proxy.

Fit of Variables

Lastly, in looking at the output for the individual independent variables—coefficients, t-statistics, and *p*-values—much can be determined. Overall, the most significant trend among all of the regressions is the relative size and impact of the coefficients for *Branches* and *Housing* as compared to all three for volume capacity (*Assets; Deposits*; and *Tier1*). This pattern is consistent in all fifteen regressions. Furthermore, in

[69] R^2, the coefficient of determination, is the ratio of the explained sum of squared to the total sum of squares, explaining how well the regression line approximates the real data—thus, the higher the R^2, the more the estimated regression equation fits the data.

[70] The F-Test indicates the extent to which the regression results could be by chance. Therefore, the more robust the *F* statistic and the lower an *F* significance factor, the more statistically significant a result is, thus confirming the validity of a given regression.

examining the t-statistics and *p*-values to identify a model with statistically significant coefficients, an interesting trend emerges:

Volume Capacity–Distribution Capacity–Borrower Capacity Models: Among the three models that utilize all three types of independent variables, no combination yields result with all coefficients statistically significant (i.e., *p*-values) at the 90% or 95% level. Only *Branches-Housing-Deposits* yields two, with *Deposits* strongly insignificant (*p*-value = 0.524) and with a counterintuitive negative coefficient. Furthermore, in each of these instances only housing has consistently robust t-statistics.

Combination of two models: Among the seven models that test all combinations of two for the independent variables, using no more than one volume capacity variable in each, four combinations had results with statistically significant *p*-values at the 95% level (*Branches-Housing; Housing-Assets; Housing-Deposits; Housing-Tier1*) and one with significance at the 90% level (*Branches-Tier1*). In the *Branches-Tier1* instance, the coefficient was also negative, counter to the hypothesized relationship to small business lending. In these instances, however, the majority of the *t*-statistics, with the exception of *Assets* in *Branches-Assets* were significantly large.

Individual Regressions: Lastly, among the five individual regressions for each independent variable against small business lending each had highly significant *p*-values and robust *t*-statistics.

D. *Best Fit Model*

Based on this analysis of fifteen regressions it is evident that several models would be sufficient to estimate small business lending. Nonetheless, for the purposes of this paper, test 2 (*Branches-Housing-Deposits*) was selected as the best fit model for further examination. This model was chosen for three distinct reasons:

- **Completeness.** This test, in addition to tests 1 and 3, each use both supply variables (distribution and volume) as well as a demand variable (borrower capacity).
- **Overall Fit.** The overall fit of test 2 was very high, with an R^2 0.953, an adjusted R^2 of 0.942, a robust F statistic of 87.31, and a high F-significance of 0.000000005.
- **More significant coefficients.** Of the complete models, test 2 is the only one in which 2 of the 3 independent variable coefficients are statistically significant (*p*-value < 0.05). In test 1 and test 2, only one variable coefficient is significant. Test 2 also has more robust t-statistics for each of the independent variable coefficients than the other models.

Deposits, the volume capacity variable, is the statistically insignificant variable in test 2 and has a negative coefficient (-0.015), which is counter to the hypothesized positive relationship with small business lending. The small magnitude of the *Deposit* coefficient suggests that it has very little impact on small business lending (further explaining the high R^2 even though the coefficient is statistically insignificant). This is confirmed by test 14, an independent regression of *Deposits* on *SBLending*. In test 14, *Deposits* had an R^2 of 0.862, a strong *F* significance (0.0000), robust *t*-statistic, and a very low *p*-value. Furthermore, the coefficient was also extremely small (0.066 in test 14 vs. -0.0416 in test 2).

Figure 12. Regression Results (Branches – Housing - Deposits)

Regression Statistics	
Multiple R	0.976070607
R Square	0.952713837
Adjusted R Square	0.941801637
Standard Error	286696529.65
Observations	17

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	2.15286E+23	7.17621E+22	87.307273	7.23496E-09
Residual	13	1.06853E+22	8.21949E+20		
Total	16	2.25972E+23			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-1.02618E+12	4.28048E+11	-2.39734031	0.0322451	-1.95092E+12	-1.01435E+11
Branches	17243720.22	6152763.239	2.80259772	0.0149551	3951483.399	30535957.05
Housing	509531390.4	272176572.8	1.87206189	0.0838642	-78470345.32	1097533126
Deposits	-0.01453996	0.022220568	-0.65434691	0.5242963	-0.062544578	0.033464658

Using the estimated coefficients and *t*-statistics, the regression equation was found and the dependent variable predicted.

SB Lending = -1,026,175,881,445.8 + 17,243,720.2 * Branches + 509,531,390.4 * Housing + -0.015 * Deposits

t-statistic → **(–2.397) (2.802) (1.872) (-0.654)**

The multivariate regression coefficients, which are similar in nature to a partial derivative, isolate the impact of each independent variable on the dependent variable small business lending. Thus, holding constant the influence of other variables in the equation, the influence of each independent variable on the dependent variable is clear. Although *Deposits*, which represents domestic deposits, is the best-fit variable to capture volume capacity based on the overall model, it has a relatively small coefficient hovering close to zero, at -0.015, and can be characterized as statistically undetermined. The coefficient also has a relatively small *t*-statistic and insignificant *p*-value. This finding suggests a small impact between a change in a bank's *Deposits* and its small business lending. An increase in *Deposits* leading to a small decrease in small business lending, as suggested by this model, is opposite of the intuitive assumption that *Deposits* are positively correlated with small business lending. As previously mentioned, the causes for this potential error could come from a variety of sources including (a) an unaccounted time lag between changes in the independent variable and its effects on the dependent variable, or (b) a lack of robust time-series data. In this instance, both may be true.

Throughout the limited periods observed, *Domestic Deposits* continually increased both as small business lending increased from 2003–2008 and when it decreased from 2008 onward. This trend makes sense as *Deposits* both grew naturally during the non-recessionary period as well as during the credit crunch since banks often sought deposits as sources of necessary liquidity and capitalization. This non-intuitive sign may also be a symptom of the observed multicollinearity. However, that would also have manifested with swings in the variable magnitude, which have been consistently small—about zero (see test 14). Therefore, the key take away from the regression output for *Deposits* is the magnitude, which hovers near zero indicating a mitigated impact.

Conversely, *Branches*, which captures distribution capacity, has a relatively high and statistically significant coefficient (17,243,720.2) and a robust t-statistic. Holding all else constant, this fact suggests that each incremental bank branch would increase small business lending by $17 million.

Housing, the borrower capacity variable, also has a relatively large and statistically significant coefficient (509,531,390.4) and robust *t*-statistic. Holding all else equal, this data suggests that a one-point increase in the S&P/Case Shiller Composite 10 Index, meaning an increase in home values, would increase borrower capacity by an incremental $509 million. It should be noted that the above analysis assumes constant demand based on one's capacity.

1. *Residual Output*

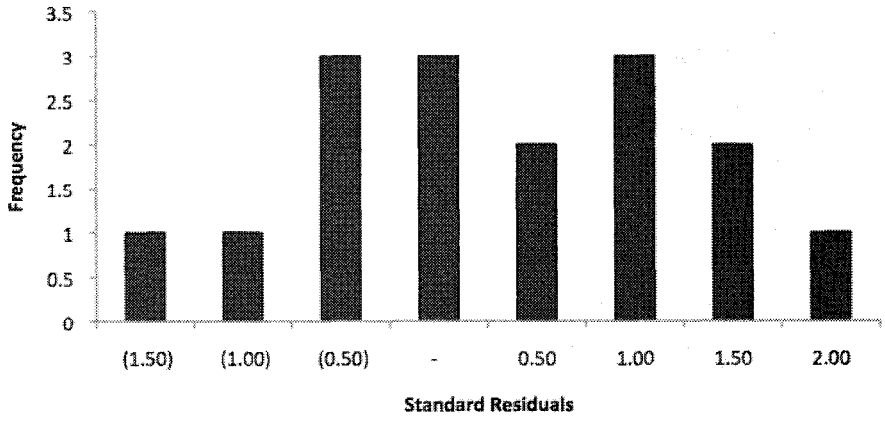
In analyzing the model residuals, the difference between the actual *SBLending* values and the estimated *SBLending* values, much is evident.

Figure 13. Residual Analysis Data

Observation	*SB Lending (Actual)*	*SB Lending (Predicted)*	*Residuals*	*Standard Residuals*
1	$ 349,839,955,000	$ 375,271,704,215	$ (25,431,749,215)	$ (0.98)
2	$ 368,280,949,000	$ 388,803,122,352	$ (20,522,173,352)	$ (0.79)
3	$ 388,826,125,000	$ 404,577,362,026	$ (15,751,237,026)	$ (0.61)
4	$ 410,849,424,000	$ 421,696,037,219	$ (10,846,613,219)	$ (0.42)
5	$ 440,478,258,000	$ 442,527,983,234	$ (2,049,725,234)	$ (0.08)
6	$ 481,914,060,000	$ 456,929,600,608	$ 24,984,459,392	$ 0.96
7	$ 509,369,694,000	$ 475,028,872,692	$ 34,340,821,308	$ 1.33
8	$ 534,971,939,000	$ 495,181,794,051	$ 39,790,144,949	$ 1.54
9	$ 549,197,039,000	$ 526,688,574,146	$ 22,508,464,854	$ 0.87
10	$ 577,321,017,000	$ 573,509,515,711	$ 3,811,501,289	$ 0.15
11	$ 601,479,505,000	$ 619,058,563,480	$ (17,579,058,480)	$ (0.68)
12	$ 634,189,004,000	$ 663,082,117,342	$ (28,893,113,342)	$ (1.12)
13	$ 686,759,579,000	$ 684,534,769,560	$ 2,224,809,440	$ 0.09
14	$ 711,452,500,000	$ 686,363,370,569	$ 25,089,129,431	$ 0.97
15	$ 695,225,317,000	$ 665,545,788,046	$ 29,679,528,954	$ 1.15
16	$ 652,247,329,000	$ 662,358,980,567	$ (10,111,651,567)	$ (0.39)
17	$ 609,415,717,000	$ 660,659,255,181	$ (51,243,538,181)	$ (1.98)

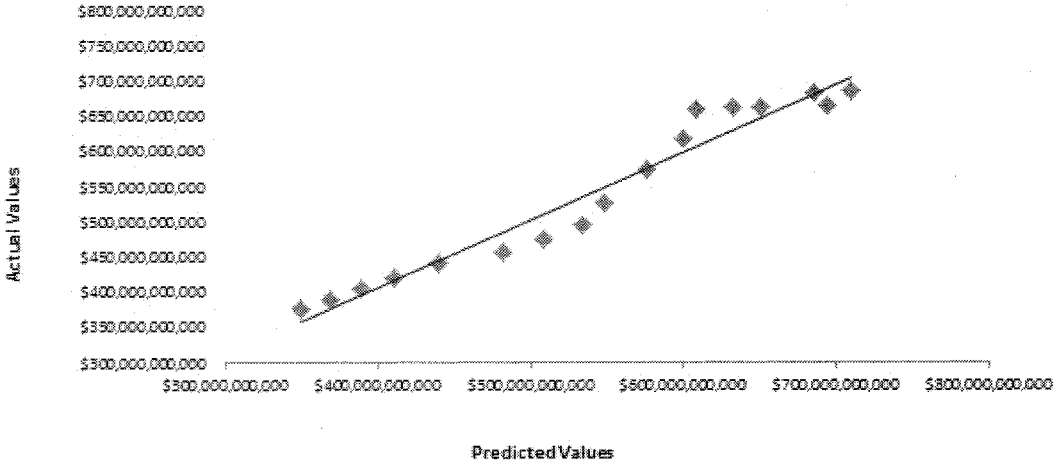
Firstly, in plotting a histogram of the standard residuals, the distribution approximates normal, indicating the relative strength of the overall model.

Figure 14. Standard Residuals



However, when plotting the predicted *SBLending* variables against the actual *SBLending* variables, a non-randomized trend emerges that indicates potential autocorrelation of the data.

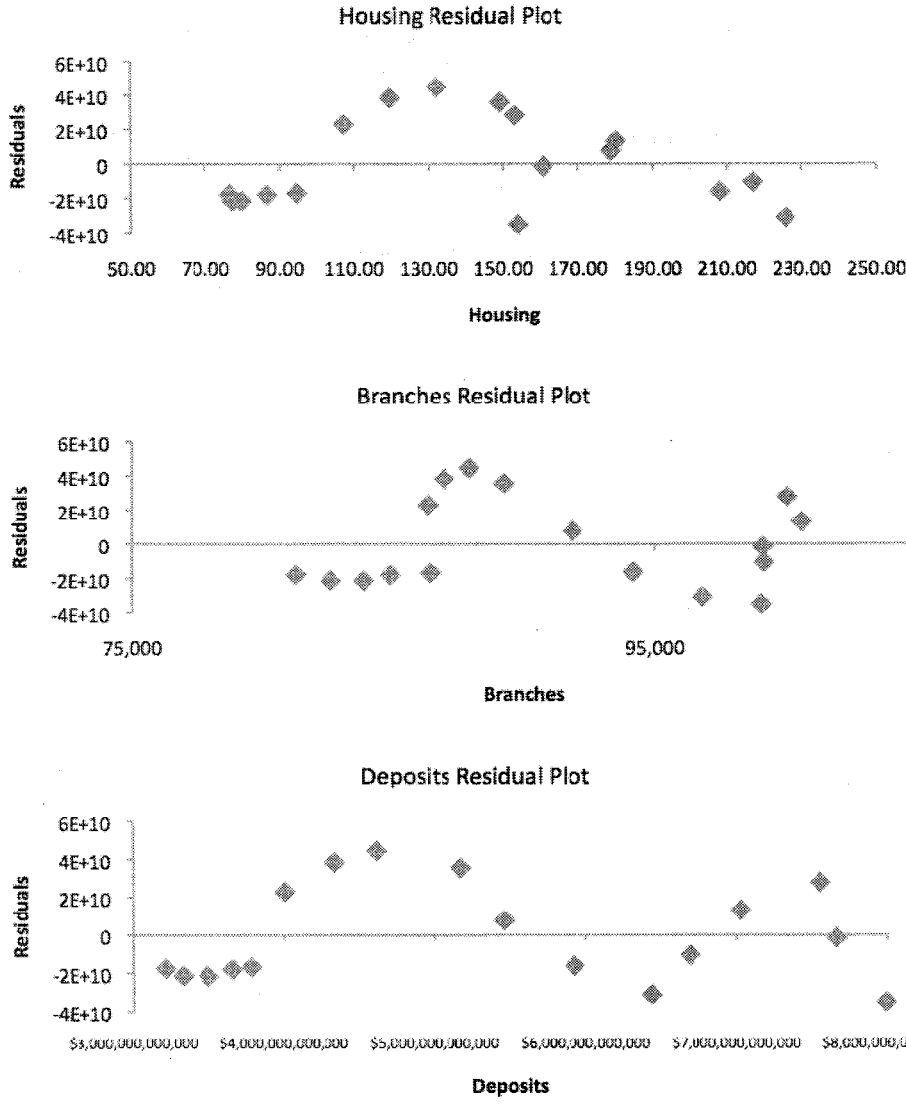
Figure 15. Scatterplot & Data – Predicted vs. Actual Small Business Lending



This potential autocorrelation is further confirmed by observing the residuals for each of the independent variables. Although there is fair

dispersion of the residuals around zero, the assumption is that the sum of errors is zero and is not related. The residuals are clearly related and patterned in a way that suggests positive autocorrelation between error terms.

Figure 16. Residual Plots

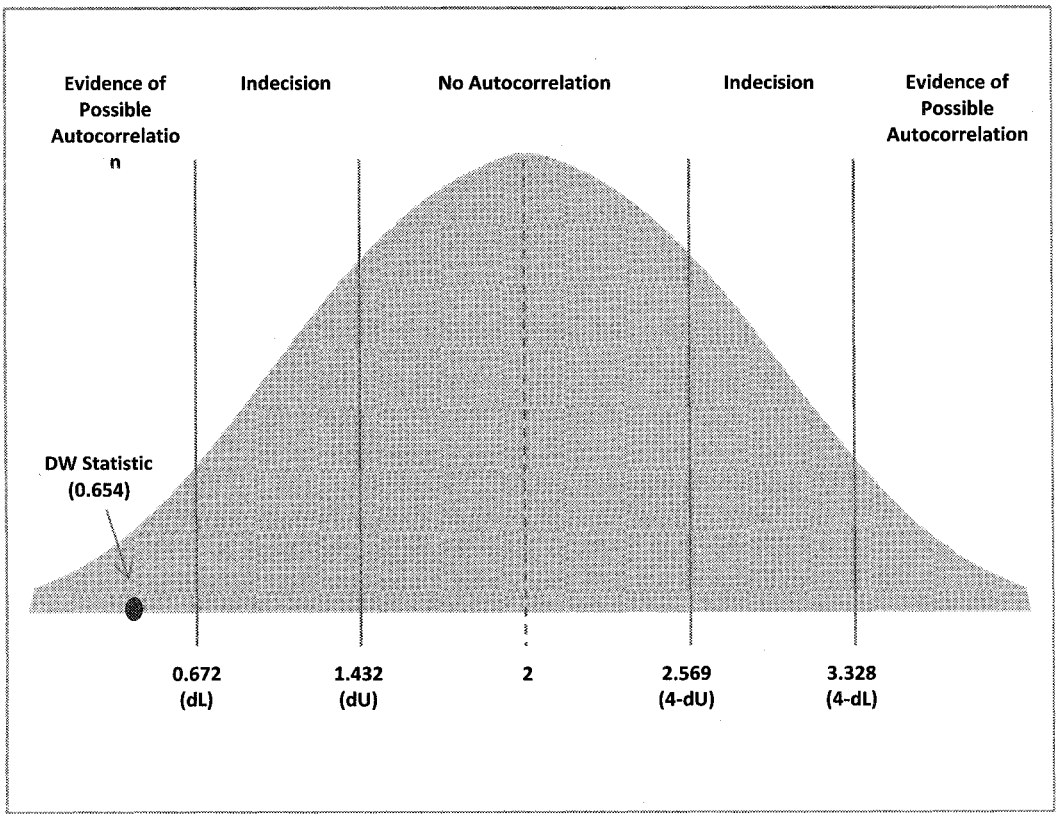


E. *Autocorrelation*

Given the evidence of potential autocorrelation, in the data, several tactics can be taken to further detect such serial correlation and create remedies for the model.

Durbin-Watson Statistic. Using the Durbin-Watson test, first order serial correlation in the time series regression can be identified. For a study with seventeen observations and three independent variables, upper and lower limits of the Durbin-Watson statistic are 1.432 and 0.672 respectively. And in solving for the Durbin Watson statistic, using the residuals from this model, a value of 0.654 is found (please see APPENDIX for calculation). With a Durbin Watson statistic of 0.654 there is evidence of positive autocorrelation.

Figure 17. Durbin Watson Test



As such, errors associated with a given time period in this model affect predictions in future periods. This phenomenon manifests by underestimating standard errors and inflating *t*-statistics. This autocorrelation can be caused by a myriad of factors including business cycles, specification bias (of variable or form) and data lags, among others.

F. *Analysis Results*

This study set out to examine the causal relationship between independent variables for a bank's volume capacity, distribution capacity, and a borrower's capacity on the dependent variable of small business lending. Overall the evidence across fifteen regressions is consistent that a strong positive relationship does exist between distribution capacity and borrower capacity—with a relatively weaker (mainly positive) relationship existing with volume capacity.

Intuitively, for statistically significant positive volume capacity instances (i.e., tests 13–15), these results make sense as volume capacity for all three proxies is purely a gating factor (albeit a vital one). A bank must have appropriate capitalization to be able to lend (i.e., the gate), but increased capitalization may not in and of itself lead to increased lending. Furthermore, distribution capacity or points of access via branches are specifically necessary to lend small business dollars (and assuming constant borrower demand), as Borrower Capacity increases a borrower will capitalize on their higher valued collateral to consistently take on more debt.

Nonetheless, this model does have limitations that require future study.

- **More Robust Data.** More robust time-series data is vital to further explore the factors that affect small business lending. Going forward this data will be available given FDIC's move to report outstanding loans by size quarterly in 2010, as well as the future reporting of actual demand side data (applications, rejections, etc.) to the Consumer Finance Protection Bureau as mandated by Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010[71] (Dodd-Frank). Until such data is available, however, studies based on limited data should be mainly leverage for their directional findings and insights.
- **Autocorrelation errors.** An issue that often emerges in time-series data, as in this model, is one of auto-correlation in which errors in estimation from one period carry over to another. Future studies should look to assess fixes to this problem such as the Cochrane-Orcutt Estimation. One limitation of the

[71] Pub. L. No. 111-203, 124 Stat. 1376 (2010).

Cochrane-Orcutt estimation, as with any fix of potential lagged endogenous variables, is the loss of a time-period. In low data observation (i.e., low n) instances such as this study, such data loss could create additional externalities.

Despite these model limitations, which affect the errors, clear directional relationships between independent variables for lender volume capacity, lender distribution capacity, and borrower capacity, are manifest. From a government loan guaranty perspective, therefore, the impact of each incremental branch and points of access is of prime importance.

V. CONCLUSION

From this study the importance of lender volume capacity, lender distribution capacity and borrower capacity to small business lending is clear; however, each affect the small business lending market at distinct magnitudes. Volume capacity has a much lower delta for changes in small business lending and appears to serve mainly as a *gating* variable for banks—a bank must be properly capitalized to lend (i.e., the *gate*). However, a strong causal relationship does not exist in which increased capital itself drives lending. As such, vital Administration efforts to support the capitalization of banks were imperative to allow additional programs to specifically move the needle on small business lending. Conversely, distribution capacity, or branches, and borrower capacity, or collateral value, have a strong causal relationship and large direct impact on small business lending.

The importance of points of access

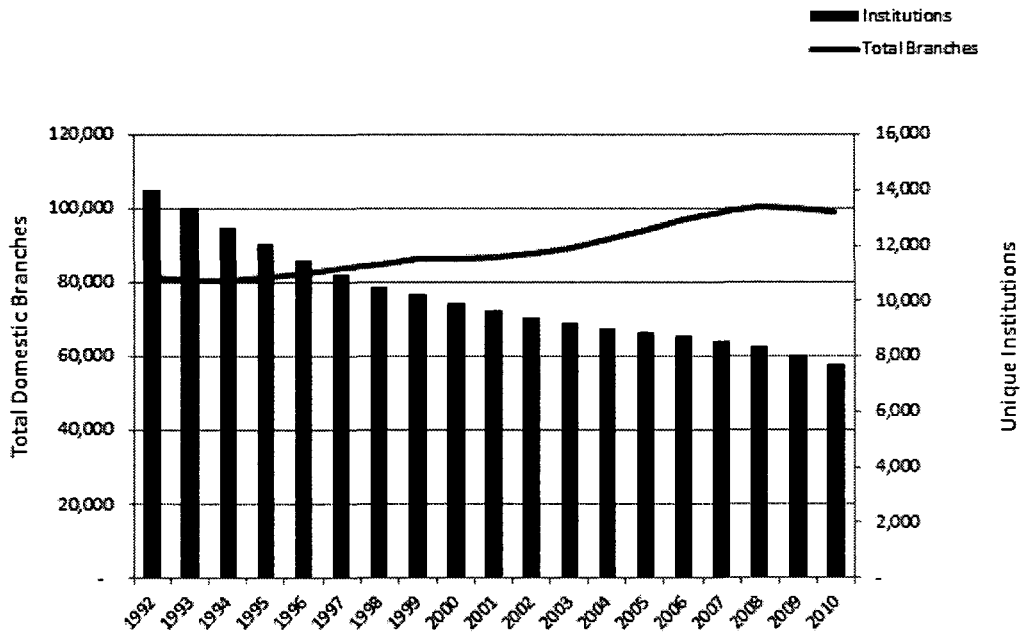
Specific to government support and the analysis found in this paper, increased distribution capacity (working parallel to other initiatives) is imperative. Increased points of access is vital to augmenting small business support and capitalizing changes in the overall credit market such as easing credit standards or programmatic innovations like the Recovery Act and the Jobs Act provisions.

Evidence proves that increasing points of access have been a commitment of the U.S. Small Business Administration since the outset of the credit crunch, where over 1200 new lenders have been recruited and are active in the 7(a) program since passage of the Recovery Act in February 2009. Additionally, the government has launched new loan programs that extend the government 7(a) guaranty to non-bank mission based lenders

such as Community Development Financial Institutions (CDFIs), Certified Development Companies (CDCs), and microlender intermediaries.[72]

A framework to increase points of access in order to reach small businesses and increase lending must look both at the branch level (as examined in the above analysis) as well as lender, or institution level.

Figure 18. Bank Branches vs. Active FDIC Insured Institutions December 1992 to December 2010



Source: FDIC Call Report Data

Although the number of branches, defined as domestic offices, has grown by 21.7% since 1992, the number of unique FDIC insured institutions has decreased by 45.1%.[73] The effects of such institutional consolidation on small business lending itself are contested and must be examined further. Some literature argues that the consolidation of smaller

[72] Specifically, the SBA Community Advantage program launched in February 2011 provides 7(a) authority to mission based lenders for loans up to $250,000 with an 85% guaranty below $150,000 and 75% up to $250,000. *Advantage Loan Initiatives,* SBA.GOV, http://www.sba.gov/advantage (last visited Sept. 15, 2011).

[73] *FDIC Statistics on Depository Institutions (SDI),* http://www2.fdic.gov/sdi/main.asp. Unique Institutions are defined as Unique FDIC Certificate # and/or Institution name in FDIC Call Report data for a given time period.

or focused lenders actually increases small business credit availability.[74] Others note that in areas where competition is reduced, the impact is adverse.[75] A fundamental understanding of these implications is necessary for strategic outreach and program design for future government support initiatives.

In conclusion, small businesses represent a vital component of the American economy. Half of all Americans work for a small business and over 99% of all firms are small.[76] Furthermore, these firms are especially sensitive to changes in the credit markets since a majority of small businesses rely on banks for their financing needs.[77] As a result, during periods of frozen credit markets, government programs are often enacted to support increased small business lending and decrease frictions in the market. As evidenced by this study (see Section IV), physical points of access are a key driver in increasing small business lending and taking advantage of critical government programs. Therefore, it is imperative that any government response to a credit crisis, much like that in 2008, includes a strategic effort to increase lending institution participation (i.e., points of access).

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[74] Joe Peek & Eric S. Rosengren, *Bank Consolidation and Small Business Lending: It's Not Just Size That Matters*, 22 J. BANKING & FIN.799 (1998).

[75] Charles Ou, *Banking Consolidation and Small Business Lending: A Review of Recent Research,* SBA OFFICE OF ADVOCACY (Mar. 2005), *available at* http://archive.sba.gov/advo/research/ wkp05ou.pdf.

[76] *Employment Size of Employer and Nonemployer Firms*, U.S. CENSUS BUREAU (2008), *available at* http://www.census.gov/econ/smallbus.html.

[77] 68% of firms cite at least one bank credit product as their top three sources of financing. *Access to Credit: Poll Evidence from Small Businesses*, COMMUNITY AFFAIRS OFFICE, FED. RESERVE BANK OF NEW YORK, 3 FACTS & TRENDS NO. 2 (October 2010).

APPENDIX

A1. Regression Analysis

Regression Test 1. Branches – Housing - Assets

Regression Statistics	
Multiple R	0.975962362
R Square	0.952502532
Adjusted R Square	0.941541578
Standard Error	28733636605
Observations	17

ANOVA

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	3	2.15239E+23	7.17462E+22	86.89960045	7.44699E-09
Residual	13	1.07331E+22	8.25622E+20		
Total	16	2.25972E+23			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-3.38999E+11	7.11899E+11	-0.476190263	0.641842367	-1.87696E+12	1.19896E+12
Branches	7386520.12	10102424.25	0.731163129	0.477652283	-14438440.53	29211480.77
Housing	605949369.8	264394660.1	2.291836641	0.039248625	34759434.22	1177139305
Assets	0.013008211	0.021430792	0.60698696	0.554313372	-0.0332902	0.059306623

Regression Test 2. Branches–Housing-Deposits

Regression Statistics	
Multiple R	0.976070607
R Square	0.95271383
Adjusted R Square	0.941801637
Standard Error	28669652965
Observations	17

ANOVA

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	3	2.15286E+23	7.17621E+22	87.30727396	7.23496E-09
Residual	13	1.06853E+22	8.21949E+20		
Total	16	2.25972E+23			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-1.02618E+12	4.28048E+11	-2.397340315	0.032245129	-1.95092E+12	-1.01435E+11
Branches	17243720.22	6152763.239	2.80259772	0.014955172	3951483.399	30535957.05
Housing	509531390.4	272176572.8	1.872061894	0.083864228	-78470345.32	1097533126
Deposits	-0.01453996	0.022220568	-0.654346917	0.524296327	-0.062544578	0.033464658

Regression Test 3. Branches–Housing–Tier1

Regression Statistics	
Multiple R	0.977288445
R Square	0.955092704
Adjusted R Square	0.944729482
Standard Error	27939190416
Observations	17

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	2.15824E+23	7.19413E+22	92.16175221	5.17834E-09
Residual	13	1.01478E+22	7.80598E+20		
Total	16	2.25972E+23			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-1.22071E+12	4.51612E+11	-2.703001099	0.018090144	-2.19636E+12	-2.4506E+11
Branches	19796521.63	6257089.202	3.163854788	0.007469711	6278902.262	33314141
Housing	451473411.6	273204678.2	1.652509812	0.12236466	-138749410.9	1041696234
Tier1	-0.145954727	0.136729091	-1.067473833	0.305180832	-0.441339968	0.149430515

Regression Test 4. Branches–Assets

Regression Statistics	
Multiple R	0.966080573
R Square	0.933311673
Adjusted R Square	0.923784769
Standard Error	32808617955
Observations	17

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	2.10902E+23	1.05451E+23	97.96589591	5.86609E-09
Residual	14	1.50697E+22	1.07641E+21		
Total	16	2.25972E+23			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-9.45655E+11	7.54579E+11	-1.253222045	0.230651655	-2.56407E+12	6.72756E+11
Branches	16134675.26	10680055.28	1.510729563	0.153095675	-6771765.071	39041115.58
Assets	0.001646093	0.02380633	0.069145172	0.945851978	-0.049413407	0.052705593

Regression Test 5. Branches–Deposits

Regression Statistics	
Multiple R	0.969518514
R Square	0.939966149
Adjusted R Square	0.931389884
Standard Error	31128710242
Observations	17

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	2.12406E+23	1.06203E+23	109.6008821	2.81043E-09
Residual	14	1.3566E+22	9.68997E+20		
Total	16	2.25972E+23			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-1.46478E+12	3.88964E+11	-3.76583836	0.002087007	-2.29902E+12	-6.30531E+11
Branches	23648596.35	5552451.797	4.259126818	0.000793968	11739771.69	35557421.01
Deposits	-0.028388945	0.022750163	-1.247856778	0.232552146	-0.07718319	0.020405301

Regression Test 6. Branches–Tier1

Regression Statistics	
Multiple R	0.972450229
R Square	0.945659448
Adjusted R Square	0.937896512
Standard Error	29615907722
Observations	17

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	2.13692E+23	1.06846E+23	121.817241	1.39916E-09
Residual	14	1.22794E+22	8.77102E+20		
Total	16	2.25972E+23			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-1.66264E+12	3.85755E+11	-4.310103055	0.000719349	-2.49E+12	-8.35281E+11
Branches	26074367.57	5270188.843	4.947520544	0.000214435	14770936.73	37377798.41
Tier1	-0.236871767	0.132683468	-1.785239496	0.095896397	-0.521449501	0.047705967

Regression Test 7. Branches–Housing

Regression Statistics	
Multiple R	0.975272478
R Square	0.951156406
Adjusted R Square	0.94417875
Standard Error	28078042803
Observations	17

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	2.14934E+23	1.07467E+23	136.3145968	6.63213E-10
Residual	14	1.10373E+22	7.88376E+20		
Total	16	2.25972E+23			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-7.62234E+11	1.40293E+11	-5.433176364	8.81865E-05	-1.06313E+12	-4.61337E+11
Branches	13410700.55	1843423.261	7.274889515	4.06421E-06	9456950.894	17364450.21
Housing	568824112.1	251354001.2	2.263039814	0.040056049	29723398.17	1107924826

Regression Test 8. Housing–Assets

Regression Statistics	
Multiple R	0.974961175
R Square	0.950549292
Adjusted R Square	0.943484905
Standard Error	28252005492
Observations	17

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	2.14797E+23	1.07399E+23	134.5551015	7.23115E-10
Residual	14	1.11745E+22	7.98176E+20		
Total	16	2.25972E+23			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	1.81234E+11	23001382874	7.879254896	1.63395E-06	1.31901E+11	2.30567E+11
Housing	678991625.6	240692148.4	2.820996156	0.013606005	162758311.3	1195224940
Assets	0.028402	0.003934777	7.218197908	4.43751E-06	0.019962742	0.036841258

Regression Test 9. Housing–Deposits

Regression Statistics	
Multiple R	0.961323927
R Square	0.924143694
Adjusted R Square	0.913307078
Standard Error	34991202786
Observations	17

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	2.0883E+23	1.04415E+23	85.27973684	1.44525E-08
Residual	14	1.71414E+22	1.22438E+21		
Total	16	2.25972E+23			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	1.71534E+11	29662057818	5.782953818	4.74248E-05	1.07916E+11	2.35153E+11
Housing	933693463.9	276097884.4	3.381747984	0.004472364	341522398.8	1525864529
Deposits	0.044749664	0.008296636	5.393711746	9.46788E-05	0.026955149	0.062544179

Regression Test 10. Housing–Tier1

Regression Statistics	
Multiple R	0.959434295
R Square	0.920514166
Adjusted R Square	0.909159047
Standard Error	35818541115
Observations	17

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	2.0801E+23	1.04005E+23	81.06600659	2.0046E-08
Residual	14	1.79616E+22	1.28297E+21		
Total	16	2.25972E+23			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	2.06469E+11	27886536736	7.403891877	3.33281E-06	1.46658E+11	2.6628E+11
Housing	976279584.5	278307434.2	3.507917736	0.00348002	379369506.3	1573189663
Tier1	0.267630131	0.05138717	5.208111847	0.000132605	0.157415612	0.377844649

Regression Test 11. Branches

Regression Statistics	
Multiple R	0.966068786
R Square	0.933288899
Adjusted R Square	0.928841492
Standard Error	31701547936
Observations	17

ANOVA

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	1	2.10897E+23	2.10897E+23	209.8501326	3.17197E-10
Residual	15	1.50748E+22	1.00499E+21		
Total	16	2.25972E+23			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	9.97272E+11	1.06486E+11	9.365263432	1.17575E-07	1.22424E+12	7.70302E+11
Branches	16868433.2	1164448.06	14.48620491	3.17197E-10	14386470.92	19350395.48

Regression Test 12. Housing

Regression Statistics	
Multiple R	0.875507626
R Square	0.766513604
Adjusted R Square	0.750947844
Standard Error	59307853230
Observations	17

ANOVA

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1.7321E+23	1.7321E+23	49.24357155	4.15783E-06
Residual	15	5.27613E+22	3.51742E+21		
Total	16	2.25972E+23			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	2.46883E+11	44350442473	5.56664913	5.39009E-05	1.52353E+11	3.41414E+11
Housing	2084430258	297038400	7.017376401	4.15783E-06	1451307898	2717552618

Regression Test 13. Assets

Regression Statistics	
Multiple R	0.960437415
R Square	0.922440028
Adjusted R Square	0.917269364
Standard Error	34182217547
Observations	17

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	2.08445E+23	2.08445E+23	178.3987299	9.87074E-10
Residual	15	1.75264E+22	1.16842E+21		
Total	16	2.25972E+23			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	1.93621E+11	27317602932	7.08779062	3.69857E-06	1.35395E+11	2.51848E+11
Assets	0.037381328	0.002798716	13.35659874	9.87074E-10	0.031416005	0.04334665

Regression Test 14. Deposits

Regression Statistics	
Multiple R	0.928535804
R Square	0.862178739
Adjusted R Square	0.852990655
Standard Error	45565854917
Observations	17

ANOVA

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1.94828E+23	1.94828E+23	93.83661832	7.58109E-08
Residual	15	3.11437E+22	2.07625E+21		
Total	16	2.25972E+23			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	1.8816E+11	38091959151	4.939621669	0.000178064	1.06969E+11	2.69351E+11
Deposits	0.066430123	0.006857706	9.686930283	7.58109E-08	0.051813268	0.081046978

Regression Test 15. Tier 1

Regression Statistics	
Multiple R	0.922306365
R Square	0.850649031
Adjusted R Square	0.8406923
Standard Error	47433528847
Observations	17

ANOVA

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1.92223E+23	1.92223E+23	85.43456766	1.39302E-07
Residual	15	3.37491E+22	2.24994E+21		
Total	16	2.25972E+23			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	2.42949E+11	34265436410	7.090214122	3.68375E-06	1.69914E+11	3.15984E+11
Tier1	0.40544555	0.043864757	9.243082151	1.39302E-07	0.311950034	0.498941065

B. *Durbin-Watson Test*

Durbin Watson Test. Deposits

Observation	SBLending (Actual)	SBLending (Predicted)	Residuals	Standard Residuals	$(Residual_t - Residual_{t-1})^2$	$Residual^2$
1	$ 349,839,955,000	$ 375,271,704,215	$ (25,431,749,215)	$ (0.98)		646,773,868,139,384,000,000
2	$ 368,280,949,000	$ 388,803,122,352	$ (20,522,173,352)	$ (0.79)	24,103,935,160,104,800,000	421,159,599,070,147,000,000
3	$ 388,826,125,000	$ 404,577,362,026	$ (15,751,237,026)	$ (0.61)	22,761,833,424,009,700,000	248,101,467,843,384,000,000
4	$ 410,849,424,000	$ 421,696,037,219	$ (10,846,613,219)	$ (0.42)	24,055,334,688,913,200,000	117,649,018,316,961,000,000
5	$ 440,478,258,000	$ 442,527,983,234	$ (2,049,725,234)	$ (0.08)	77,385,238,209,132,200,000	4,201,373,536,514,220,000
6	$ 481,914,060,000	$ 456,929,600,608	$ 24,984,459,392	$ 0.96	730,847,138,404,561,000,000	624,223,211,101,780,000,000
7	$ 509,369,694,000	$ 475,028,872,692	$ 34,340,821,308	$ 1.33	87,541,508,310,736,100,000	1,179,292,008,123,760,000,000
8	$ 534,971,939,000	$ 495,181,794,051	$ 39,790,144,949	$ 1.54	29,695,128,136,764,900,000	1,583,255,635,025,230,000,000
9	$ 549,197,039,000	$ 526,688,574,146	$ 22,508,464,854	$ 0.87	298,656,466,906,278,000,000	506,630,990,062,245,000,000
10	$ 577,321,017,000	$ 573,509,515,711	$ 3,811,501,289	$ 0.15	349,576,446,535,203,000,000	14,527,542,075,614,100,000
11	$ 601,479,505,000	$ 619,058,563,480	$ (17,579,058,480)	$ (0.68)	457,556,047,245,617,000,000	309,023,297,057,144,000,000
12	$ 634,189,004,000	$ 663,082,117,342	$ (28,893,113,342)	$ (1.12)	128,007,837,422,127,000,000	834,811,998,621,028,000,000
13	$ 686,759,579,000	$ 684,534,769,560	$ 2,224,809,440	$ 0.09	968,325,118,310,548,000,000	4,949,777,045,353,820,000
14	$ 711,452,500,000	$ 686,363,370,569	$ 25,089,129,431	$ 0.97	522,777,128,645,143,000,000	629,464,415,610,952,000,000
15	$ 695,225,317,000	$ 665,545,788,046	$ 29,679,528,954	$ 1.15	21,071,767,781,963,400,000	880,874,438,945,599,000,000
16	$ 652,247,329,000	$ 662,358,980,567	$ (10,111,651,567)	$ (0.39)	1,583,338,047,297,740,000,000	102,245,497,418,459,000,000
17	$ 609,415,717,000	$ 660,659,255,181	$ (51,243,538,181)	$ (1.98)	1,691,832,096,393,950,000,000	2,625,900,205,297,130,000,000
				Total	**(1) 7,017,531,072,872,790,000,000**	**(2) 10,733,084,343,290,700,000,000**

Durbin-Watson (1 / 2)	**0.653822**